REMARKS

Entry of this Supplemental Amendment and reconsideration and allowance are respectfully requested in view of the foregoing amendments and the following remarks.

Upon entry of this Supplemental Amendment, claims 1-3, 7-15 and 18-25, 27 and 28 will be pending in the application. Claim 27 has been amended for clarity and claim 28 has been newly added to more fully claim the invention as originally disclosed.

In the previous Office action, claims 7-9 were rejected under 35 U.S.C. §102(b) by Gustafsson. This rejection is respectfully traversed because Gustafsson does not disclose every feature recited in the rejected claims.

Claim 7 is directed to an apparatus for producing a pulse of light including a housing, a light path out of the housing, a gas filled arc lamp light source within the housing operable to produce the pulse of light, and a filter for filtering undesired light output frequencies from the pulse positioned in the light path from the light source so as to receive light and to output filtered light to exit the housing. The filter is positioned in the light path out of the housing and filters undesired light output frequencies from the pulse. Moreover, the filter receives light and outputs filtered light to exit the housing.

Gustafsson does not disclose the apparatus for producing a pulse of light having a filter as recited in claim 7. Specifically, Gustafsson's apparatus does not have a filter positioned in the light path out of the housing, nor does Gustaffson's apparatus have a filter that receives light and outputs filtered light to exit the housing.

For example, Fig. 3 of Gustafsson shows a xenon flash tube positioned within a cavity containing water. The cavity also contains a pipe 71 containing a material designed to accept light of one frequency and to transform it into light of another frequency. The Rhodamin material receives light of one frequency, e.g., blue green light, but transforms it to another

frequency, e.g., yellow light. Thus, the Rhodamin material, which is present in the pipe 71, is not an optical filter because it is an active material which is a secondary light emitter in the system. Moreover, the Rhodamin material is not a passive filter, as recited in claim 28.

The water does not serve the purpose of an optical filter, but is present as a cooling liquid. The water serving as a cooling material is not present in a light path out of the housing, rather the water surrounds the pipe 71. Further, the water does not receive light and output filtered light to exit the housing because light in Gustaffson's apparatus is only emitted from the housing through total internal reflection (see Fig. 4). For light to be totally internally reflected within the pipe 71, light must be emitted by the Rhodamin material contained in the pipe 71. In Gustaffson's apparatus, light not emitted by the Rhodamin material will not pass out of the housing, but rather will be consumed by the repeated reflection and absorption within the water of the device, being turned into heat. Thus, the water cannot be an optical filter and cannot be the filter recited in claim 7.

In contrast, the filter as recited in claim 7 filters undesired light output frequencies from the pulse and is positioned in the light path to exit the housing. Further, the filter as recited in claim 7 receives light and outputs filtered light to exit the housing. Gustafsson does not disclose a filter, as recited in claim 7.

Submitted herewith are copies of materials from the European patent prosecution file corresponding to U.S. Patent No. 5,320,618 issued to Morgan Gustaffson, which show further differences between Gustaffson's apparatus disclosed in U.S. Patent No. 5,320,618 and the apparatus recited in independent claim 7. These materials include a copy of a response to the European Patent Office on behalf of the applicant, Morgan Gustaffson, and a copy of a declaration filed by the inventor, Morgan Gustaffson, during prosecution of Mr. Gustaffson's corresponding European application. In the sixth paragraph of the declaration, Mr.

Gustaffson states that one does not with any reasonably sized device achieve the desired selective absorbed wavelength band width with any lamp, with or without a passive filter and that the only way to get the desired wavelength band was with a fluorescent dye. Moreover, the response to the European Patent Office on behalf of Mr. Gustaffson presents arguments why the fluorescing light is different from the filter recited in claim 7 (see page 2, third paragraph), much less a passive filter recited in claim 28.

Therefore, Mr. Gustaffson's apparatus is only directed to fluorescing light and fluorescent dye and Mr. Gustaffson's declaration along with the response to the European Patent Office dismiss the notion that Gustaffson's apparatus uses or was intended to use a filter – passive or otherwise.

For the reasons set forth above, Gustafsson does not disclose the apparatus for producing a pulse of light as recited in claim 7. Accordingly, withdrawal of the rejection of claim 7 is respectfully requested. Claims 8 and 9 are allowable by virtue of their dependence on claim 7, and also for their recitation of additional patentable features.

Withdrawal of the rejection of claims 7-9 is respectfully requested.

In response to the Advisory Action, claim 27 previously did not contain new issues or new matter. Since Applicants have decided to pursue alternative protection, claim 27 is only amended to clarify and more fully claim subject matter originally disclosed in the application.

All objections and rejections have been addressed. It is respectfully submitted that the present application is now in condition for allowance.

Should the Examiner believe that anything further is desirable to place the application in better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number listed below.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached Appendix is captioned **"Version with markings to show changes made"**.

Respectfully submitted,

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Enclosure:
Appendix

APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Please amend claim 27 as follows:

27. (Amended) Apparatus as claimed in claim 7, wherein said pulse of light is [substantially only] passively filtered by the liquid and the passively filtered light exits said housing.

New claim 28 is added.

END OF THE APPENDIX

ALBIHNS
SINCE 1891

Our ref: 102765 APK/PK
European Patent Application No. 91908411.1-2212
Publ. No. 0 533 686
Applicant: Morgan Gustafsson

European Patent Office
D-80298 MÜNCHEN
Tyskland

We thank you for your communication of January 4, 1996.

With regard to chapter 1 of the communication which mention the omission of the first lens we must say the following.

This lens 3 is only mentioned in connection with fig. 1 on page 2 line 27 and 28. In the embodiment shown in fig. 1 the lens 3 is described and it is not mentioned at any place in the decsription that this lens 3 should be important. Such a lens 3 is not shown and is accordingly omitted from the embodiments which are disclosed in the drawings 3, 4 and 5. In the description of these drawings neither any lens 3 has been mentioned. We therefore are of the firm opinion that omitting lens 3 in the preamble of claim 1 is not an infringement of art. 123 (2) EPC as bases can be found for omitting this lens.

The examiner objects also to the term "dyed liquid solution". However, on page 5 lines 6 to 22 of the description a dyed liquid solution is described. This dyed solution which preferably changes blue-green light to yellow light and consists of for instance "rhodamin" solved in for instance alcohols is the same liquid as can be used in the devise 6 of fig. 1. This dyed solution does not only filtrate the light but changes it as mentioned in this cited chapter of page 5.

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We do not fully understand the examiners objections in his paragraph 3 where he says that no such liquid can be seen which changes the light to give the proper wave length. On line 10 and 11 of page 5 the expression "changes a relatively large amount of the light emitted from the lamps" is given.

the US patent 3 327 712 describes a surgical device which is based on the use of high intensity light from an incandecent lamp, a mercury vapor lamp, a strobotron or an optical maser or the like. By using that kind of light sources and a passive filter only short pulses are obtainable in the range of 0,5-1 milliseconds usually around 0,35 milliseconds. As mentioned in our claims we can obtain pulses up to 10 milliseconds.

A major difference between the cited reference D1 and the present invention is that light is changed by fluorescing in the present invention whereas a passive filter is used in the reference. In the characterising part of claim 1 this fluorescing has been clearly stated.

The inventor has drafted an explanation of his invention and we enclose this explanation hereby. It may be further discussed and explained and we therefore propose a conference between the inventor and the examiner.

Göteborg May 7, 1996
Medical Bio Care
gm/ALBIHN WEST AB

Alf P Kristiansen

Encl.

EXRE 3, see p. 55-58

An attempt to explain my invention

Background
Removing dermal disfigurations such as telangiectasias by means of selective photo-thermolysis with light is commonly performed with a dye laser.
The reason a laser commonly is chosen is because with it one can obtain an electro-magnetic wave-length band-width where the epidermis and the dermis is less potent in absorbing the light and the haemoglobin in the erythrocytes, the red blood cells, has a higher absorbtion of the light.
The mechanism for permanently and without scarring removing blood vessels from the skin is that the haemoglobin absorbs the light and becomes warm. The heat is dissipated to the red blood cell and further to the blood plasma. When the blood plasma reaches a certain temperature it coagulates. The heat is also transmitted to the inner of the vessel wall, the endothelium. The vessel wall is partly destroyed (coagulated) by the mentioned heat.
The remainders of the vessel is removed from it´s location by macrophages and histiocytes ("white blood cells"). Heat may not reach outside the vessel as then scarring is likely to occur.

The light must be delivered in rather high energy pulses. If the light energy is irradiated with low intensity and under a long time period, the vessel will have time to cool off meanwhile the irradiation and the treatment will be a failure. On the other hand, ~~if the~~ if the light needed is delivered in a to short period of time, the plasma will evaporate and the gas formed will make the vessel burst with intradermal bleeding as a result. Hence, not only the wave length band width and the energy amount per pulse is important, but also the pulse width.

(Also the spot size is of importance. If the spot size (the dot on the skin that is treated with one pulse) is to small, the light will not penetrate deep enough into the skin. This happens as the, in a two dimensional drawing of the cross section of the skin and the incident and penetrating light, the two wave fronts will cross each other before the light reaches the desired depth. A minimum spot size for efficient treatment has been calculated to in between a diameter of 1 mm and to 3 mm.)

I was treating, among other skin disorders, vascular lesions with a standard type dye laser.
The pulses available with a flash lamp pulsed dye laser did not exceed 0.5 ms and was normally around 0.36 ms. With an Argon laser pumped dye laser also the energy flux was insufficient.

In order to be able to treat vessels of larger diameter than those typically found in port wine stains I struggled with various solutions for obtaining longer pulses.
It was well known by then that when one went down to 525 nm and below the selective absorbtion of the haemoglobin was lost and that only a small difference in absorbtion is needed in order to achieve selective photo-thermolysis. One wants to narrow the emission to, see the submitted graph, 540 - 590 nm, one benefits also from light above 590 nm and a bit up in the 600 nm region. We have claimed a band with of 585 nm +/- 10%, which well corresponds to the actual needs of colour properties of the light.

One does not, with reasonable sized device, achieve the desired selectively absorbed wave length band width with any lamp, with or without a passive filter.
The only way to get the desired wave length band width was with a fluorescent dye. The only way known of obtaining high enough flux from such a dye was using a flash lamp pumped dye laser incorporating said dye.
One does not achieve long enough pulses for somewhat thicker diameter vessels with a dye laser. The reason for this is known as triplet quenching, see below.

For lasing to occur one has a fluorescing lasing materia incorporated into a transparent host. Lasing is obtained through a domino effect for which more than 50% of the molecules of the fluorescing materia must be charged up to an exited state of energy. This is called population inversion.

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After population inversion a photon emitted in the right wave length band width for pumping the dye is more likely to hit an already charged up molecule than a molecule in it's ground state of energy. When a photon hits an exited molecule two photons are emitted from said molecule and in the same direction. This is called stimulated emission.

The problem
The dyes used in the above mentioned dye lasers does to some extent not end up in the preferred charged energy level when irradiated with light (from a lamp or a laser), but ends up hanging in another energy state called triplet state. When a photon hits a molecule in this triplet state it does not send out two photons, but absorbs the incident photon and emits heat. Hence after a certain time of light pumping of the lasing material, the population inversion will decline to under 50% and so the population inversion will persist no more, resulting in that the lasing session ends. This is called triplet quenching of the pulse.

The solution
The main idea of my invention is to make longer pulses. By, instead of using Light Amplification by Stimulated Emission of Radiation = LASING, using what I call Light Amplification by Shifted Emission and Refraction, described in my patent application although the mentioned term was not invented at the time, one is not depending on population inversion for the light pulse. Thereby the triplet quenching is not a problem in the case.

One can, in contrast with a passively filtered lamp, stay within the preferred wave length band width with sufficient energy flux and produce pulses several times longer than with a dye laser.

The described entrapped florescence is ended a new way of obtaining light in a predetermined wave length band width. It's superior sides compared with what previously has existed are attempted to be described above.

A second difference - a second way of building a device according to my invention
One more important thing we claim is a band width stretching up to and above 600 nm, as the small difference in absorbtion between haemoglobin and melanin there is enough for selective photo-thermolysis and the, over the vessel lying, melanin does not have a to high absorbtion in itself to stop penetration of the treatment light down to the vessels.
However going in the other direction, towards the UV, melanin absorbs more and more and at approximately between 500 - 525 nm melanin absorbs more than haemoglobin. The UV (from approximately 400 nm and down) is not only useless for the treatment, it is also potentially harmful. By allowing light up through the red, i.e. exceeding the limitation of 600 nm described by Kaufman in the patent of 1967, one can filter the light from a lamp, a Xenon lamp or another lamp, by means comprehensive enough for practical use.
The light below approximately 500 - 525 is counteracting the mechanism of selective photo-thermolysis, why the claim by Kaufman regarding a wave length band width of 300 - 600 nm in practice means maximum (500 - 525 nm) - 600 nm, i.e. maximum 100 nm wide.
A device using a passive filter according to my invention can range up to at least 3 times wider in emission band width direct from a light source such as a lamp, i.e. up to 900 nm and a little further. However a bit after 900 nm water will start having a significant absorbtion of the incident light. When this is higher than the absorbtion of haemoglobin the wavelength is not longer of significant use.

During our work, this is what surprisingly came to us as an understanding. This is ended a new invention for light irradiation, presenting physicall and physiological properties never described before.

Kind regards

Morgan Gustafsson

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Application No./Patent No.	Ref.	Date
91908411.1-2305	P21018.31EPP	15. 11. 96
Applicant/Proprietor: GUSTAFSSON, Morgan		

Communication pursuant to Article 96(2) and Rule 51(2) EPC

The /further/ examination of the above-identified application has revealed that it does not meet the requirements of the European Patent Convention for the reasons enclosed herewith. If the deficiencies indicated are not rectified the application may be refused pursuant to Article 97(1) EPC.

You are invited to file your observations and insofar as the deficiencies are such as to be rectifiable to correct the indicated deficiencies within a **period**

of 4 **months**

from the notification of this communication, this period being computed in accordance with Rules 78(3) and 83(2) and (4) EPC.

Amendments to the description, claims and drawings are to be filed where appropriate within the said period in **three copies** on separate sheets (Rule 36(1) EPC).

Failure to comply with this invitation in due time will result in the application being deemed to be withdrawn (Article 96(3) EPC).

EUROPÄISCHES PATENTAMT · EUROPEAN PATENT OFFICE · OFFICE EUROPÉEN DES BREVETS · MÜNCHEN

E. Stiegler
Primary examiner
for the Examining Division

Communication despatched, EXRE and statistical data recorded

Enclosures: 3 page/s reasons (Form 2906)

Date Initials

Registered letter

File Copy

EPO Form 2001.2 07.93

Bescheid/Protokoll (Anlage) | Communication/Minu[illegible] (Annex) | Notificatio[illegible]ocès-verbal (Annexe)
Datum / Date / Date: 15. 11. 96
Blatt / Sheet / Feuille: 1
Anmelde-Nr. / Application No.: 91 908 411.1
Demande n°.

The examination is being carried out on the following application documents:

Description:
Pages 1, 5 as originally filed
Pages 2-4, 6, 7 as filed with your letter of 01.11.95

Claims:
Nos. 1-9 filed with your letter of 01.11.95

Drawings:
Sheets 3/5 - 5/5 as originally filed
Sheet 1/5 as filed with your letter of 07.03.95
Sheet 2/5 as filed with your letter of 01.11.95

*****

1. In his letter dated 07.05.96 the applicant states that lens 3 is only mentioned in with fig. 1. Such a lens is not shown in the embodiments of figures 3,4 and 5. The applicant's attention is, however, drawn to page 5 , line 1 of the description where it is indicated that the preferred embodiment of fig. 2 functions in principle as the earlier described base model. The cited passage means that also in the preferred embodiment a first lens 3 is provided.

   Moreover, original claim 1 defines a first lens 3.

   Consequently, the omission of the first lens 3 between the source of light and the fibre optical cable from the preamble of claim 1 constitutes an infringement of Art. 123 (2) EPC as already mentioned in the communication

dated 04.01.96.

To overcome the above objection it is necessary to re-introduce the omitted feature.

2. The objection of the term **dyed liquid solution** is no longer upheld.

3. Present claim 1 does not mention any fluorescing liquid. That is the reason why your argument given in the letter of 01.11.95 is of no meaning as to the inventive step of claim 1.

Reading the inventor's explanation of his patent application also makes clear that a fluorescent liquid is of importance.

The examiner tried to find such a **fluorescent liquid** expressively mentioned in the description. However, only **a liquid in the quartz glass** could be found on page 5, line 7.

Consequently, the following problem is seen by the examiner.

In order to fulfil the requirements of Art. 84 in combination with Rules 29 (1) and (3) EPC (any independent claim must contain all the technical features essential to the invention) it appears to be necessary to include **the fluorescent liquid** into claim 1.
On the other hand, no **fluorescent liquid** is disclosed in the application as originally filed.

One possibility to overcome the above problem would be introducing the feature of page 5, lines 10,11 into claim 1. This feature, however, does not clearly indicate the fluroscene property.

4. The applicant is requested to file new claims which take account of the above comments.

5. At this stage of the procedure a formal interview in the presence of the inventor is of no help since only questions concerning purely patent law are to be discussed.

E. Siegl